

## SEQUENCE LISTING

<110> DSM NV

<120> Improved method for the prevention or reduction of haze in beverages.

<130>

<140>

<141>

<150>

<151>

<150>

<151>

<150>

<151>

<160> 7

<170> PatentIn Ver. 2.1

<210> 1

<211> 1581

<212> DNA

<213> Aspergillus niger

<400> 1

atgctgctt tctcgtgt cgctgctgc gccctggcgc tctctgggc gtctctggct 60  
caggctgctc gccccgtct tggcccaag cctgtctctc ggccagcctc gagtaaatcg 120  
gtcgcgacca cgggcgaggc ttacttgag cagctgctgg accatcataa tccggagaag 180  
ggcacctttt cccagaggta ctggtggagt actgaatact ggggtgggtc tgggtcaccg 240  
gtgtctctct ttactctgg agaggtctct gccgatggct atgaggggta tctaccaat 300  
gggactctca ctggtgtcta tgcgcaggag atccagggtg ccgtcattct cattgagcac 360

cgctactggg gtgattcttc tcctatgag gtgctcaatg ccgaaactct tcagtacctc 420  
acactggacc aagccattct ggacatgacc tactogccg agacggtgaa gctgcaattc 480  
gataacagca ccgcagcaa tgcgcagaat gctccctggg tcatggctcg tgatcatac 540  
agtgggtgct tgacggctg gaccgaatct gtgcgcctg gaacgttctg ggcttaccat 600  
gccactagtg ctctgtgga ggctatctac gactattggc aatacttta ccccatccag 660  
caagglatgg cacagaactg cagcaaggac gtgtctctg tagccgagta tgcgacaag 720  
attgaaaga acggaactgc caaggagcag caggcactca aggaattgtt tggctggga 780  
gctgtgagc atttgatga cttgcccgt gtctcccca acggaccgta cctctggcaa 840  
gacaacgact ttgccacggg atactcttc ttctccagt tctgtgacgc cgtcgagggt 900  
gtcgaagccg gcgcggcagt aacccccggc ccgaggggtg tcggcctcga aaaggccctg 960  
gccaactacg caaactgggt caattcaacc attctccctg attactgctc aagctacggc 1020  
tactggaccg acgaatggag cgtgcctgc ttgcacagct acaacgcctc gagccccatc 1080  
tacaccgata cctccgtagg caatgccgc gaccgccaat gggaatgggt cctctgcaac 1140  
gagccttct tctactggca ggacgggtct ccgagggta cctccacat tgtgccccga 1200  
ctcgtcagcg cctctactg gcaacggcaa tgtccgctc actccccga aacgaacggc 1260  
tacacgtacg gcagcgcgaa gggaagaac gccgccacgg tgaacagctg gaccggtgga 1320  
tgggatatga ccgcaacac gacgcggtg atctggacga acgggcaata tgaccctgg 1380  
cgggactccg gtgtgtcag cacttccgg ccggtggac cgctggcgag cacggcgaat 1440  
gaaccgtgc agattatcc ggcggattc cattgctcg attgtatat ggcgattat 1500  
tatgcgaatg aggggggtaa aaagggtgtg gataatgagg tgaagcagat caaggagtgg 1560  
gtggaggagt attatgcctg a 1581

<210> 2

<211> 3290

<212> DNA

<213> *Aspergillus niger*

<400> 2

gagaggcaga aggagtcatt tatcactgt attccaatgt atttccatt tatagatact 60  
gcattcaaat gcaccgttta gcatagcatc ccacattcta ttcatcca atctcatgcc 120  
attgccaatc ccggtattaa ttactctc cgcttatct tgcaatctg caatctttt 180  
ctctcgta tcacgcgtc ctgcaggcgc acctccgatg gcactgcagc cggagtcccc 240  
gcggcgcgg cactactaaa gactaaagt tctagtctag cctccaatgt gctcacctcc 300  
atcagcatct catcattta tctctgacg atgtcatctg caggctccac cccctccggc 360  
cgccccgacg ctctccgacg gtgcacaaca atcaattctg cagtcacgct caagattcgt 420  
ccctgccgga ctctcatgc cgtgcctggt ttaatctatg caatggagta aggtagtatc 480

gcctagcagg agcggagttc ctgctgcgt cagccatgg tgccggcgca gacataaatc 540  
gctcgtttcc tccggcgctg gccgttctc cgagccagtt tctctgtgt ggttgtagga 600  
tctctgttc cctcgacag ctcaaatgc gtctcttc cgttgtcgt gccgcgtcac 660  
tggcgctctc tggggcgtc ctggcccagg ctgctcgcc cgtcttgtg cccaagccta 720  
tctctggcc agctcgagt aagtcggctg cgactacggg tgaggcttat ttgagcagc 780  
tgctggacca tcacaaccg gagaaggga cgtttcca gccgtactg tgagtagctg 840  
aatactggg tggacctgg tcaccgtgc gtctcgaca ttggtcta tgaccggcca 900  
tatgaaact tagccggtg caaggccgc aatcatgagg aacattgctg attaaactag 960  
gtgtctct ttaacctg agaggtctc gccgatggc atgagggta tctaccaac 1020  
gatactca ctggtctc tgcgcaggag atccagggt cgtcattct cattgaactg 1080  
gagtgtact gctacatgg aaaaaagaca ttcgctgac gacccaatc tagaccgcta 1140  
ctggggcgac tctcgctt atgaggtgct caatgcgaa acattcagt atctacact 1200  
ggatcagtc attctggaca tgactact cgccgagac gtaaagctg agtgcgataa 1260  
tagcagccg agcaatgcg agaatgctg atgtacct caccgccta tgtttctgat 1320  
aggtagtac aacgtagccc tgggtcatg tgggtggc atacagcgt gccttgacgg 1380  
cttgaccga gtctatcg cctggaact tctgggcta ccatgccacc agtgcgctg 1440  
tggaggctat ctatgactt gtaggttag cctgcttg ttatctatac ttgcagctaa 1500  
ccaagccagt ggcaatact ctacccatt cagcaaggta tggcacagaa ctgcagcaag 1560  
gatgtgtc tggtagcca gtatgtgac aaaattgga agaattggaac tgccaaggaa 1620  
cagcaggagc tcaaagaatt gttggtcg ggagctgt agcattacga tgacttgcc 1680  
gctgagtac tcaaagtct atagcagac tttctgaca ggaacagtgt cctgccaac 1740  
ggaccgtacc tctggcaaga caacgactt gtcacaggat actctctt ctccagttc 1800  
tgtatgctg tcgaggtgag ttaccaccag attccttg attgaagcaa tataclaacg 1860  
gacacaggg gtggaagccg gcgcggcagt gaccccgcc cccgagggcg tcggactga 1920  
aaaggccctg gccaaactac caaactggt caattcaacc atactcccta actgtattc 1980  
accatctt gtctgttc tctccctt cctccagac taacctagt acagactcg 2040  
caagctacg ctactggacc gacgaatga gcgtcgctg ttogacagc tataatgcct 2100  
cgagcccat ctacccgac acctcgtg gtaacctgt cgaccgcaa tgggaatggt 2160  
tctctgcaa cgagccttc tctggtggc aggagtgcg acccctacc tcatcatga 2220  
taacacaga acaattcac taacaagat ccagcgtgc cccgagggg acctccacta 2280  
tttgccccg gctcgtcag gccctctact ggcaacgca atgcccgtc tactccccg 2340  
aagttaacg ctacacgtac ggcagcgca agggtaaaaa ctccgtacg tgaacagct 2400  
ggacgggtg atgggatag acccgcaaca cgacgcggt gatctggacg aacgggtagg 2460  
tctcccccta attccgtg aatgtatgt gaagataaac tcaatgctaa taaattgaga 2520  
aggcaatat acccctggc cgactcggg gtgtcgagc cttccggcc cgtgtgctg 2580  
ctggttagc cggcgaacg acccgtcag attattccg gcgggtcca ttgctcgac 2640  
ttgtatgagg aggtacta tgcgaatgag ggtgtgagga aggtggtga taatgagtg 2700

aagcagatta aggagtgggt ggaggagtat tatgcttgat gaagatactg gtggacatat 2760  
ggagtgtaca taagatgaat ggtcataaaa tgatgatggt agatacggct atggctgttg 2820  
attagatggt cctttcgcat ttctaatta ctgagcacgt gctccatggt atgggaagtg 2880  
gagacgttgc tatatatatt gactgtcggg ctattgtca cggcgtagaa gctagacgct 2940  
ttgtctatgt ggccttcact aaagacgtg actctgccca gtcttcccc ctgcaggac 3000  
ctggtattag ccaaaccac ccacaaacct acaaagatc atcgtgacat tgaagtcact 3060  
ctaggctacg ctggcgctga ttacagtggc tcaattogaa calttcaaca gcacataagg 3120  
gaagggtcgc ttacttgct acctgatac gaaagcagcc acgccaaca ctatagggg 3180  
tgacaacat cggcatgctg ggttatctac tatatctct gattctgtgg atcctggaga 3240  
tcgatctggt acactaatct actacaatgc atgtgaagta gggataggca 3290

<210> 3

<211> 1581

<212> DNA

<213> *Aspergillus niger*

<400> 3

atgcgttctt tctccgttgt cgctgccggt tcactggcgc tctctgggc gtctctggcc 60  
caggctgtct gccccgtct tgtgccaaag cctatctctc ggccagcttc gagtaagtcg 120  
gctgcgacta cgggtgaggg ttattttgag cagctgctgg accatcaciaa cccggagaag 180  
ggaacgtttt cccagcggta ctggtggagt actgaatact ggggtggacc tgggtcaccg 240  
gtggtcctct ttaaccctgg agaggtctct gccgatggct atgaggggta tctaccaaac 300  
gatactctca ctggtgtcta tgcgcaggag atccagggtg ccgtcattct cattgaacac 360  
cgctactggg gcgactcttc gccttatgag gtgtcaatg ccgaaacact tcagtatctc 420  
acactggatc agtccattct ggacatgacc tacttcgccc agacggtaaa gctgcagttc 480  
gataatagca gccgcagcaa tgcgcagaat gctccctggg tcatggtcgg tggctcatc 540  
agcgggtgct tgacggcttg gaccgagctc atcgcgcctg gaacgttctg ggcttaccat 600  
gccaccagtg cgctgtgga ggctatctat gactttggc aatacttcta cccattcag 660  
caaggtatgg cacagaactg cagcaaggat gtgtctctgg tagccgagta tgcgacaaa 720  
attgggaaga atggaactgc caaggaacag caggagctca aagaattgtt tggctgga 780  
gctgttgagc attacgatga cttgcccgt gtctgccca acggaccgta cctctggcaa 840  
gacaacgact ttgtcacagg atactcttc ttctccagt tctgtgatgc tgcgagggt 900  
gtcgaagccg gcgcggcagt gacccccgc cccgaggcgc tggacttga aaaggccctg 960  
gccaactacg caaactggtt caattcaacc atactcccta actactgcgc aagctacggc 1020  
tactggaccg acgaatggag cgtgcctgt ttgcacagct ataatgcctc gagccccatc 1080  
ttaccgaca cctccgtggg taaccctgtc gaccgccaat gggaatggtt cctctgaac 1140

gagccttct tctggtggca ggaagggtgc cccgagggaa cctccactat tgtgccccgg 1200  
ctcgtcagcg cctcctactg gcaacgcaa tgcccgtct acttccccga agttaacggc 1260  
tacacgtacg gcagcgcgaa gggtaaaaac tccgctacgg tgaacagctg gacgggtgga 1320  
tgggatatga cccgcaacac gacgcgggtg atctggacga acgggcaata tgaccctgg 1380  
cgcgactcgg gtgtgtcag cactttcgg cccgggtggtc cgctggtag cacggcgaac 1440  
gaaccgtgc agattattcc gggcgggttc cattgctcgg actgtatat ggaggattac 1500  
tatgcgaatg aggggtgtgag gaagggtgtt gataatgagg tgaagcagat taaggagtgg 1560  
gtggaggagt attatgcttg a 1581

&lt;210&gt; 4

&lt;211&gt; 526

&lt;212&gt; PRT

&lt;213&gt; Aspergillus niger

&lt;400&gt; 4

Met Arg Ser Phe Ser Val Val Ala Ala Ala Ser Leu Ala Leu Ser Trp

1 5 10 15

Ala Ser Leu Ala Gln Ala Ala Arg Pro Arg Leu Val Pro Lys Pro Ile

20 25 30

Ser Arg Pro Ala Ser Ser Lys Ser Ala Ala Thr Thr Gly Glu Ala Tyr

35 40 45

Phe Glu Gln Leu Leu Asp His His Asn Pro Glu Lys Gly Thr Phe Ser

50 55 60

Gln Arg Tyr Trp Trp Ser Thr Glu Tyr Trp Gly Gly Pro Gly Ser Pro

65 70 75 80

Val Val Leu Phe Asn Pro Gly Glu Val Ser Ala Asp Gly Tyr Glu Gly

85 90 95

Tyr Leu Thr Asn Asp Thr Leu Thr Gly Val Tyr Ala Gln Glu Ile Gln

100 105 110

Gly Ala Val Ile Leu Ile Glu His Arg Tyr Trp Gly Asp Ser Ser Pro  
115 120 125

Tyr Glu Val Leu Asn Ala Glu Thr Leu Gln Tyr Leu Thr Leu Asp Gln  
130 135 140

Ser Ile Leu Asp Met Thr Tyr Phe Ala Glu Thr Val Lys Leu Gln Phe  
145 150 155 160

Asp Asn Ser Ser Arg Ser Asn Ala Gln Asn Ala Pro Trp Val Met Val  
165 170 175

Gly Gly Ser Tyr Ser Gly Ala Leu Thr Ala Trp Thr Glu Ser Ile Ala  
180 185 190

Pro Gly Thr Phe Trp Ala Tyr His Ala Thr Ser Ala Pro Val Glu Ala  
195 200 205

Ile Tyr Asp Phe Trp Gln Tyr Phe Tyr Pro Ile Gln Gln Gly Met Ala  
210 215 220

Gln Asn Cys Ser Lys Asp Val Ser Leu Val Ala Glu Tyr Val Asp Lys  
225 230 235 240

Ile Gly Lys Asn Gly Thr Ala Lys Glu Gln Gln Glu Leu Lys Glu Leu  
245 250 255

Phe Gly Leu Gly Ala Val Glu His Tyr Asp Asp Phe Ala Ala Val Leu  
260 265 270

Pro Asn Gly Pro Tyr Leu Trp Gln Asp Asn Asp Phe Val Thr Gly Tyr  
275 280 285

Ser Ser Phe Phe Gln Phe Cys Asp Ala Val Glu Gly Val Glu Ala Gly  
290 295 300

Ala Ala Val Thr Pro Gly Pro Glu Gly Val Gly Leu Glu Lys Ala Leu

305            310            315            320

Ala Asn Tyr Ala Asn Trp Phe Asn Ser Thr Ile Leu Pro Asn Tyr Cys

325            330            335

Ala Ser Tyr Gly Tyr Trp Thr Asp Glu Trp Ser Val Ala Cys Phe Asp

340            345            350

Ser Tyr Asn Ala Ser Ser Pro Ile Phe Thr Asp Thr Ser Val Gly Asn

355            360            365

Pro Val Asp Arg Gln Trp Glu Trp Phe Leu Cys Asn Glu Pro Phe Phe

370            375            380

Trp Trp Gln Asp Gly Ala Pro Glu Gly Thr Ser Thr Ile Val Pro Arg

385            390            395            400

Leu Val Ser Ala Ser Tyr Trp Gln Arg Gln Cys Pro Leu Tyr Phe Pro

405            410            415

Glu Val Asn Gly Tyr Thr Tyr Gly Ser Ala Lys Gly Lys Asn Ser Ala

420            425            430

Thr Val Asn Ser Trp Thr Gly Gly Trp Asp Met Thr Arg Asn Thr Thr

435            440            445

Arg Leu Ile Trp Thr Asn Gly Gln Tyr Asp Pro Trp Arg Asp Ser Gly

450            455            460

Val Ser Ser Thr Phe Arg Pro Gly Gly Pro Leu Val Ser Thr Ala Asn

465            470            475            480

Glu Pro Val Gln Ile Ile Pro Gly Gly Phe His Cys Ser Asp Leu Tyr

485            490            495

Met Glu Asp Tyr Tyr Ala Asn Glu Gly Val Arg Lys Val Val Asp Asn

500            505            510

Glu Val Lys Gln Ile Lys Glu Trp Val Glu Glu Tyr Tyr Ala

515

520

525

<210> 5

<211> 526

<212> PRT

<213> Aspergillus niger

<400> 5

Met Arg Ala Phe Ser Ala Val Ala Ala Ala Ala Leu Ala Leu Ser Trp

1

5

10

15

Ala Ser Leu Ala Gln Ala Ala Arg Pro Arg Leu Val Pro Lys Pro Val

20

25

30

Ser Arg Pro Ala Ser Ser Lys Ser Ala Ala Thr Thr Gly Glu Ala Tyr

35

40

45

Phe Glu Gln Leu Leu Asp His His Asn Pro Glu Lys Gly Thr Phe Ser

50

55

60

Gln Arg Tyr Trp Trp Ser Thr Glu Tyr Trp Gly Gly Pro Gly Ser Pro

65

70

75

80

Val Val Leu Phe Thr Pro Gly Glu Val Ser Ala Asp Gly Tyr Glu Gly

85

90

95

Tyr Leu Thr Asn Gly Thr Leu Thr Gly Val Tyr Ala Gln Glu Ile Gln

100

105

110

Gly Ala Val Ile Leu Ile Glu His Arg Tyr Trp Gly Asp Ser Ser Pro

115

120

125

Tyr Glu Val Leu Asn Ala Glu Thr Leu Gln Tyr Leu Thr Leu Asp Gln

130

135

140



Ala Ile Leu Asp Met Thr Tyr Phe Ala Glu Thr Val Lys Leu Gln Phe

145            150            155            160

Asp Asn Ser Thr Arg Ser Asn Ala Gln Asn Ala Pro Trp Val Met Val

165            170            175

Gly Gly Ser Tyr Ser Gly Ala Leu Thr Ala Trp Thr Glu Ser Val Ala

180            185            190

Pro Gly Thr Phe Trp Ala Tyr His Ala Thr Ser Ala Pro Val Glu Ala

195            200            205

Ile Tyr Asp Tyr Trp Gln Tyr Phe Tyr Pro Ile Gln Gln Gly Met Ala

210            215            220

Gln Asn Cys Ser Lys Asp Val Ser Leu Val Ala Glu Tyr Val Asp Lys

225            230            235            240

Ile Gly Lys Asn Gly Thr Ala Lys Glu Gln Gln Ala Leu Lys Glu Leu

245            250            255

Phe Gly Leu Gly Ala Val Glu His Phe Asp Asp Phe Ala Ala Val Leu

260            265            270

Pro Asn Gly Pro Tyr Leu Trp Gln Asp Asn Asp Phe Ala Thr Gly Tyr

275            280            285

Ser Ser Phe Phe Gln Phe Cys Asp Ala Val Glu Gly Val Glu Ala Gly

290            295            300

Ala Ala Val Thr Pro Gly Pro Glu Gly Val Gly Leu Glu Lys Ala Leu

305            310            315            320

Ala Asn Tyr Ala Asn Trp Phe Asn Ser Thr Ile Leu Pro Asp Tyr Cys

325            330            335

Ala Ser Tyr Gly Tyr Trp Thr Asp Glu Trp Ser Val Ala Cys Phe Asp  
340 345 350

Ser Tyr Asn Ala Ser Ser Pro Ile Tyr Thr Asp Thr Ser Val Gly Asn  
355 360 365

Ala Val Asp Arg Gln Trp Glu Trp Phe Leu Cys Asn Glu Pro Phe Phe  
370 375 380

Tyr Trp Gln Asp Gly Ala Pro Glu Gly Thr Ser Thr Ile Val Pro Arg  
385 390 395 400

Leu Val Ser Ala Ser Tyr Trp Gln Arg Gln Cys Pro Leu Tyr Phe Pro  
405 410 415

Glu Thr Asn Gly Tyr Thr Tyr Gly Ser Ala Lys Gly Lys Asn Ala Ala  
420 425 430

Thr Val Asn Ser Trp Thr Gly Gly Trp Asp Met Thr Arg Asn Thr Thr  
435 440 445

Arg Leu Ile Trp Thr Asn Gly Gln Tyr Asp Pro Trp Arg Asp Ser Gly  
450 455 460

Val Ser Ser Thr Phe Arg Pro Gly Gly Pro Leu Ala Ser Thr Ala Asn  
465 470 475 480

Glu Pro Val Gln Ile Ile Pro Gly Gly Phe His Cys Ser Asp Leu Tyr  
485 490 495

Met Ala Asp Tyr Tyr Ala Asn Glu Gly Val Lys Lys Val Val Asp Asn  
500 505 510

Glu Val Lys Gln Ile Lys Glu Trp Val Glu Glu Tyr Tyr Ala  
515 520 525

<210> 6

<211> 1551

<212> DNA

<213> *Aspergillus niger*

<400> 6

atgcgttctt tctccgttgt cgctgccgcg tcaactggcgc tctctgggc gtctctggcc 60  
caggctgtct gccccgtct tgtgccaag cctatctctc ggccagcttc gagtaagtcg 120  
gctgcgacta ogggtgaggc ttatttgag cagctgctgg accatcaca cccggagaag 180  
ggaacgtttt cccagcggta ctggtggagt actgaatact ggggtggacc tgggtcaccg 240  
  
gtggctctt ttaaccctgg agaggctctt gccgatggct atgaggggta tctaccaac 300  
gatactctca ctggtgtcta tgcgcaggag atccaggggt ccgtcattct cattgaacac 360  
cgctactggg gcgactcttc gccttatgag gtgctcaatg ccgaaacact tcagtatctc 420  
aactggatc agtccattct ggacatgacc tacttgcgcg agacggtaaa gctgcagttc 480  
gataatagca gccgcagcaa tgcgcagaat gctccctggg tcatggtcgg tggctcatac 540  
agcgggtgct tgacggcttg gaccgagctt atcgccctg gaacgttctg ggcttaccat 600  
gccaccagtg cgcctgtgga ggctatctat gactttcaag gtatggcaca gaactgcagc 660  
aaggatgtgt ctctggtagc cgagtatgtc gacaaaattg ggaagaatgg aactgccaa 720  
gaacagcagg agctcaaaga attgtttggt ctgggagctg ttgagcatta cgaagacttt 780  
gccgtgtcc tgcacaacgg accgtacctc tggcaagaca acgactttgt cacaggatac 840  
tcttcttct tccagttctg tgatgtctg gaggggtgct aagccggcgc ggcagtgacc 900  
ccccggcccc agggcgctcg acttgaaaag gccctggcca actacgcaaa ctggttcaat 960  
tcaaccatac tcctaacta ctgcgcaagc tacggctact ggaccgacga atggagcgtc 1020  
gcctgttctg acagctataa tgccctgagc cccatcttca ccgacacctc cgtgggtaac 1080  
cctgtcgacc gccaatggga atggttctc tgcaacgagc ctttctctg gtggcaggac 1140  
gggtcccccg agggaaacct cactattgtg ccccggtctg tcagcgctc ctactggcaa 1200  
cgccaatgcc cgctctact cccgaagtt aacggctaca cgtacggcag cgcgaagggt 1260  
aaaaactccg ctacggtgaa cagctggacg ggtggatggg atatgacctg caacacgacg 1320  
cggttgatct ggacgaacgg gcaatatgac ccctggcgcg actccggtgt gtcgagcact 1380  
ttccggcccc gtggtccgct ggtagcacg gcgaacgaac ccgtgcagat tattccgggc 1440  
gggttccatt gctcggactt gtatatggag gattactatg cgaatgaggg tgtgaggaag 1500  
gtggtgata atgaggtgaa gcagaltaag gaatacggct atggctgttg a 1551

<210> 7

<211> 516

&lt;212&gt; PRT

&lt;213&gt; Aspergillus niger

&lt;400&gt; 7

Met Arg Ser Phe Ser Val Val Ala Ala Ala Ser Leu Ala Leu Ser Trp

1 5 10 15

Ala Ser Leu Ala Gln Ala Ala Arg Pro Arg Leu Val Pro Lys Pro Ile

20 25 30

Ser Arg Pro Ala Ser Ser Lys Ser Ala Ala Thr Thr Gly Glu Ala Tyr

35 40 45

Phe Glu Gln Leu Leu Asp His His Asn Pro Glu Lys Gly Thr Phe Ser

50 55 60

Gln Arg Tyr Trp Trp Ser Thr Glu Tyr Trp Gly Gly Pro Gly Ser Pro

65 70 75 80

Val Val Leu Phe Asn Pro Gly Glu Val Ser Ala Asp Gly Tyr Glu Gly

85 90 95

Tyr Leu Thr Asn Asp Thr Leu Thr Gly Val Tyr Ala Gln Glu Ile Gln

100 105 110

Gly Ala Val Ile Leu Ile Glu His Arg Tyr Trp Gly Asp Ser Ser Pro

115 120 125

Tyr Glu Val Leu Asn Ala Glu Thr Leu Gln Tyr Leu Thr Leu Asp Gln

130 135 140

Ser Ile Leu Asp Met Thr Tyr Phe Ala Glu Thr Val Lys Leu Gln Phe

145 150 155 160

Asp Asn Ser Ser Arg Ser Asn Ala Gln Asn Ala Pro Trp Val Met Val

165 170 175

Gly Gly Ser Tyr Ser Gly Ala Leu Thr Ala Trp Thr Glu Ser Ile Ala

180 185 190

Pro Gly Thr Phe Trp Ala Tyr His Ala Thr Ser Ala Pro Val Glu Ala

195 200 205

Ile Tyr Asp Phe Gln Gly Met Ala Gln Asn Cys Ser Lys Asp Val Ser

210 215 220

Leu Val Ala Glu Tyr Val Asp Lys Ile Gly Lys Asn Gly Thr Ala Lys

225 230 235 240

Glu Gln Gln Glu Leu Lys Glu Leu Phe Gly Leu Gly Ala Val Glu His

245 250 255

Tyr Asp Asp Phe Ala Ala Val Leu Pro Asn Gly Pro Tyr Leu Trp Gln

260 265 270

Asp Asn Asp Phe Val Thr Gly Tyr Ser Ser Phe Phe Gln Phe Cys Asp

275 280 285

Ala Val Glu Gly Val Glu Ala Gly Ala Ala Val Thr Pro Gly Pro Glu

290 295 300

Gly Val Gly Leu Glu Lys Ala Leu Ala Asn Tyr Ala Asn Trp Phe Asn

305 310 315 320

Ser Thr Ile Leu Pro Asn Tyr Cys Ala Ser Tyr Gly Tyr Trp Thr Asp

325 330 335

Glu Trp Ser Val Ala Cys Phe Asp Ser Tyr Asn Ala Ser Ser Pro Ile

340 345 350

Phe Thr Asp Thr Ser Val Gly Asn Pro Val Asp Arg Gln Trp Glu Trp

355 360 365

Phe Leu Cys Asn Glu Pro Phe Phe Trp Trp Gln Asp Gly Ala Pro Glu

370            375            380  
Gly Thr Ser Thr Ile Val Pro Arg Leu Val Ser Ala Ser Tyr Trp Gln  
385            390            395            400  
Arg Gln Cys Pro Leu Tyr Phe Pro Glu Val Asn Gly Tyr Thr Tyr Gly  
405            410            415  
Ser Ala Lys Gly Lys Asn Ser Ala Thr Val Asn Ser Trp Thr Gly Gly  
420            425            430  
Trp Asp Met Thr Arg Asn Thr Thr Arg Leu Ile Trp Thr Asn Gly Gln  
435            440            445  
Tyr Asp Pro Trp Arg Asp Ser Gly Val Ser Ser Thr Phe Arg Pro Gly  
450            455            460  
Gly Pro Leu Val Ser Thr Ala Asn Glu Pro Val Gln Ile Ile Pro Gly  
465            470            475            480  
Gly Phe His Cys Ser Asp Leu Tyr Met Glu Asp Tyr Tyr Ala Asn Glu  
485            490            495  
Gly Val Arg Lys Val Val Asp Asn Glu Val Lys Gln Ile Lys Glu Tyr  
500            505            510  
Gly Tyr Gly Cys  
515